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## ELECTRONIC VEHICLE REGISTRATION AND LICENSE PLATE

### TECHNICAL FIELD

[0001] This invention relates generally to a vehicle registration communication system and to a method of operation thereof and, more particularly, to an electronic vehicle identification and registration system 5 capable of receiving and storing information from an authorizing agency identifying a specific vehicle.

### BACKGROUND OF THE INVENTION

[0002] In recent years, the number of vehicles on the road has 10 dramatically increased. Today, record management such as vehicle registrations is provided by administrative agencies that are sometimes poorly equipped to handle the ever-increasing workload. For example, the employees of the Department of Motor Vehicles (DMV) are burdened with the responsibilities of renewing registrations, conducting vehicle inspections, 15 issuing driver's licenses for hundreds of vehicles and drivers each day, and collecting fees for each of these services. That this approach is inefficient is evident by the long lines of customers at local DMV offices. Furthermore, contracting some of these administrative tasks out to local independent service centers has not been entirely successful.

20 [0003] In addition to the many other services provided by local DMV offices, they are also responsible for the issuance of license plates that are secured to a vehicle and display data that signifies that the vehicle is properly registered with an appropriate government agency. Historically, license plates are of a simple metallic structure that is stamped to display alpha- 25 numeric information. They suffer, however, several disadvantages. For example, registration renewals are costly, and since the renewal status is

reflected on the license plate, the license plate is a target for thieves.

Additionally, traditional license plates often times clash with the esthetics of modern car styling and colors. Since they are generally attached to the rear and/or front bumpers of the vehicle, constraints are placed on the automotive

5      designers who must incorporate fascias into the bumper designs to receive the license plates.

**[0004]**      In view of the foregoing, it should be appreciated that it would be desirable to provide a method and apparatus for automatically providing registration and license plate information to a vehicle. Additional desirable features will become apparent to one skilled in the art from the foregoing background of the invention and the following detailed description of a preferred exemplary embodiment and the appended claims.

#### SUMMARY OF THE INVENTION

15      **[0005]**      In accordance with the teachings of the present invention, a method and apparatus is provided for identifying and registering a vehicle. A remote control unit receives and stores vehicle identification and registration information. At least one computer on the vehicle receives the identification and registration information from the remote control unit and

20      stores the information therein. An electronic license plate is coupled to the computer for electronically displaying at least a portion of the identification and registration information stored in the computer.

#### BRIEF DESCRIPTION OF THE DRAWINGS

25      **[0006]**      The present invention will hereinafter be described in conjunction with the appended drawings, wherein like numerals denote like elements, and wherein:

**[0007]**      FIG. 1 is a block diagram of that portion of the inventive electronic vehicle identification and registration system that shows how a

digital license plate receives registration information from a vehicular onboard computer;

**[0008]** FIG. 2 is a graphical representation of an automobile equipped with the inventive digital license plate;

5 **[0009]** FIG. 3 is a block diagram which illustrates the structure and operation of the inventive electronic vehicle identification and registration system; and

10 **[0010]** FIG. 4 is a block diagram illustrating the interface between the onboard computer and the remote control unit described in connection with FIG. 3.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

15 **[0011]** The following description of a preferred embodiment of the invention is mainly exemplary in nature and is not intended to limit the invention, the application, or the use of the invention.

20 **[0012]** As stated previously, a license plate is traditionally a metal plate that is secured to a vehicle and stamped with alpha numeric information that identifies the vehicle and signifies that the vehicle is properly registered with an appropriate government agency (e.g., the Department of Motor Vehicles (DMV)) or the Secretary of State. These stamped metal plates often clash with the vehicle's styling and color and place design constraints on the automotive designers who must design the fascias in the vehicle's bumpers for receiving the plates.

25 **[0013]** FIG. 1 and FIG. 2 illustrate a digital license plate system for an electronic vehicular identification and registration system. Digital license plate, shown generally at 10, is a molded digital display 12 that is adaptable to rear and/or front bumper fascias (shown front mounted in FIG. 2); i.e., there is no alteration to the fascias themselves. Display 12 preferably comprises a light emitting diode (LED)/liquid crystal display (LCD) system 30 which enables the formation of alpha numeric characters 14 indicative of

vehicle number and expiration date, state identification, or other logos (GO MSU) shown on the face 16 of display 12.

[0014] Digital plate 10 comprises an LED backpanel 17 which provides backpanel illumination, an intermediate LCD display panel 18 for displaying digital data, and a clear front panel 20 which serves as a protection panel and could, if desired, contain a heating grid for use in cold climates to melt ice, snow, etc. Backpanel 17 has provided thereon an LED background that is made of, for example, polymeric or organic non-pixelated LEDs. Intermediate panel 18 is a flexible polymeric LCD display for 10 converting the information signal to a digital display. Front panel 20 may actually be constructed as a part of the fascia surface and translucent to the vehicle's body paint color so as to create an esthetically pleasing appearance.

[0015] Digital plate 10 is coupled to receive information signals from CAN (Controlled Area Network) 22, which includes the required interface, 15 drivers and a dedicated processor for converting incoming information signals to digital display signals. CAN 22 may be coupled to digital plate 10 by, for example, a flat cable 24, which delivers both power and intelligence to digital plate 10. A small connector (not shown) may be designed into each bumper fascia, either as an after-market system or built into the fascia 20 as an OEM system. Digital display 10 will be designed to be extremely thin and may, for example, be secured in slots provided in the fascia.

[0016] It is well known that modern vehicles are equipped with multiple onboard computers which control different aspects of a vehicle's operation, (e.g., power train and engine control). A body computer module 25 (BCM) 26 is typically responsible for controlling functions such as information clusters on the vehicle's instrument panel, heating and air conditioning, etc. BCM 26 receives and stores the license plate information supplied over link 30 in a manner that will be described in more detail below and provides this information to CAN 22 over link 28 by means of, for 30 example, a copper harness or fiber optic cable. Since BCM 26 is factory

installed when the vehicle is being manufactured, BCM 26 could easily be programmed to contain the vehicle identification number (VIN) as well as other printed data including but not limited to reference numbers for the specific parts used on the vehicle, etc. When the vehicle is delivered to a 5 customer, additional DMV data, (e.g., plate number, registration data, etc.) specific to that vehicle may be downloaded and stored in BCM 26 as will also be described below. The customer can then annually automatically update this data.

**[0017]** The digital license plate 10 described above would be visible 10 even in extreme conditions; for example, its electric luminescent characteristic would make it visible even in intense sunlight. LED luminosity is rated in "NITS", an acronym used by the panel industry for automotive applications where issues of sunlight and glare play an important role in the readability of the display. For automotive uses, a value of 15 approximately 1000 NITS is considered acceptable for high visibility. In snowy conditions, the heat generated by the digital display maintains visual acuity intact. Furthermore, the digital license plate 10 would be turned on (i.e., the display activated) only when the vehicle is operating. When the vehicle is turned off, license plate 10 is likewise turned off. If it became 20 necessary to identify a vehicle that was not operating (i.e., engine off), a law enforcement official could easily read the VIN number which is attached to the body of the vehicle 11 and visible through the windshield shown at 32 in FIG. 2. If bar-coded, this could be accomplished through the use of a hand-held scanner. The VIN is all that is required to obtain the vehicle 25 registration information that is stored at the DMV's database.

**[0018]** As stated above, the existing vehicle registration system is a paper intense system requiring large dedicated staffs of DMV employees. In addition, paper registrations are required to be kept in the vehicle or on the person of the driver at all times. Thus, they can be easily lost, damaged, or 30 confused with other documents. The present invention avoids these

disadvantages by providing a system and procedure for encoding vehicle identification and registration information onto a smart chip built into a remote control unit normally utilized to lock/unlock the vehicle doors, trunk, ignition, etc. In some cases, this remote control unit, commonly referred to 5 as an FOB, is an integral part of the ignition key. The invention also contemplates encoding the identification and registration information including the VIN into a smart card and onto the VIN plate, each of which would include a smart chip into which the vehicle identification and registration and other relevant information could be stored. Storing the 10 information in the VIN plate would permit access to the information when the vehicle is turned off.

**[0019]** Referring to FIG. 3, registration information from the authorizing agency's (e.g., DMV) database 34 is downloaded over the Internet, for example, to a customer's personal computer (PC) 36 via link 15 38. If this is occurring at the time of initial sale of the vehicle, PC 36 could be located at the car dealership. If a yearly renewal is taking place, PC 36 could be any personal computer accessible to the customer. Further, if the transaction involves a yearly renewal requiring a fee, the fee could be paid electronically by providing the customer's credit card information back to the 20 DMV by means of read/write unit 40 and PC 36 over links 42 and 44, again perhaps over the Internet.

**[0020]** Registration, vehicle identification and other relevant information are then communicated via link 46 to remote control unit 48 via read/write unit 40. Remote control unit 48 may be a key FOB 50 or a smart 25 card 54 each containing a smart chip 52 (see FIG. 4). Smart chip 52 contains a non-volatile memory that stores the registration, identification, and other information provided by read/write unit 40. Key FOB 50 and/or smart card 54 are each powered by a small battery that in the case of a key FOB may be charged by inserting the key into the ignition.

[0021] The description thus far describes how remote control unit 48 receives new data via the Internet from the DMV database 34. It should be clear that alternatively, a customer could bring remote control unit 48 to a local DMV for programming. The interrelationship between remote control

5 unit 48, vehicle input interface 60, and body computer module 62 is best described by additionally referring to FIG. 4. Vehicle input interface 60 includes a transponder 64 housed within vehicle 11. Transponder 64 interrogates a transponder in smart chip 52 as is shown by RF link 66. Smart chip 52 responds to this interrogation. If the registration is a new one,

10 smart chip 52 informs transponder 64 of that fact, and transponder 64 transmits the new data to BCM 26 via link 30 for storage therein. BCM 26 then provides the updated data to digital license plate 10 via CAN 22 as was described earlier in connection with FIG. 1 and as is shown in FIG. 3. If, on the other hand, the registration data in smart chip 52 is not new and the

15 driver is merely attempting to enter and start the vehicle, BCM 26 compares the registration and identification data being supplied by smart chip 52 via transponder 64 and link 30 with that already stored in BCM 26. In this way, remote control unit 48 is validated, and the vehicle and the ignition are unlocked.

20 [0022] The inventive vehicle identification and registration system offers several distinct advantages. The process is electronic and handled through digital media. Its substantially eliminates the need for a paper registration process and fosters accuracy and efficiency. State government would benefit greatly due to the elimination of the necessity to service

25 customers periodically at DMV offices, generate and mail paper documentation, and produce and mail metal license plates. This greatly reduces overhead and streamlines the entire process.

[0023] From the foregoing description, it should be appreciated that a method and apparatus for electronically providing vehicular registration and

30 identification information has been provided. While the preferred exemplary

embodiment has been presented in the foregoing detailed description, it should be appreciated that a vast number of variations in the embodiments exist. It should also be appreciated that this preferred exemplary embodiment is only an example and is not intended to limit the scope, 5 applicability, and configuration of the invention in any way. Rather, the foregoing detailed description provides those skilled in the art with a convenient road map for implementing a preferred embodiment of the invention. It should be clear that various changes in form and detail might be made by one skilled in the art without departing from the spirit and scope 10 of the invention as set forth in the appended claims.